Amendments to the claims

This listing of claims will replace all prior versions and listings of the claims.

Listing of Claims:

1-42. (Cancelled)

43. (Previously presented) A laser comprising:

an optical gain medium comprising a concentrated solid including a plurality of semiconductor nanocrystals, the plurality of semiconductor nanocrystals being close-packed; and

a cavity arranged relative to the optical gain media to provide feedback, wherein the concentrated solid provides gain to an optical signal at an energy equal to or less than the maximum band gap emission of the nanocrystals.

44. (Original) The laser of claim 43, wherein each of the plurality of semiconductor nanocrystals includes a same or different first semiconductor material selected from the group consisting of a Group II-VI compound, a Group II-V compound, a Group III-VI compound, a Group III-V compound, a Group IV-VI compound, a Group I-III-VI compound, a Group II-IV-VI compound, and a Group II-IV-V compound.

45. (Previously presented) The laser of claim 44, wherein each first semiconductor material is overcoated with a second semiconductor material.

46. (Original) The laser of claim 45, wherein each first semiconductor material has a first band gap and each second semiconductor material has a second band gap that is larger than the first band gap.

47. (Previously presented) The laser of claim 43, wherein the plurality of nanocrystals have an rms deviation in diameter of less than 15%.

48. (Cancelled)

49. (Previously presented) A method of amplifying an optical signal comprising:

directing an optical beam into a gain medium including a concentrated solid including a plurality of semiconductor nanocrystals, the plurality of semiconductor nanocrystals being close-packed and having an rms deviation in diameter of less than 15% wherein the concentrated solid is substantially free of defects and provides gain to the optical signal at an energy equal to or less than the maximum band gap emission of the nanocrystals when excited by a source.

50. (Original) The method of claim 49, wherein each of the plurality of semiconductor nanocrystals includes a same or different first semiconductor material selected from the group consisting of a Group II-VI compound, a Group II-V compound, a Group III-VI compound, a Group III-V compound, a Group IV-VI compound, a Group I-III-VI compound, a Group II-IV-VI compound, and a Group II-IV-V compound.

51. (Previously presented) The method of claim 50, wherein each first semiconductor material is overcoated with a second semiconductor material.

52. (Previously presented) The method of claim 51, wherein each first semiconductor material has a first band gap and each second semiconductor material has a second band gap that is larger than the first band gap.

53. (Previously presented) A method of forming a laser comprising:

arranging a cavity relative to an optical gain medium to provide feedback to the optical gain medium, wherein the optical gain medium comprises a concentrated solid including a

plurality of semiconductor nanocrystals, the plurality of semiconductor nanocrystals being close packed.

54. (Original) The method of claim 53, wherein each of the plurality of semiconductor nanocrystals includes a same or different first semiconductor material selected from the group consisting of a Group II-VI compound, a Group II-V compound, a Group III-VI compound, a Group III-V compound, a Group IV-VI compound, a Group I-III-VI compound, a Group II-IV-VI compound, and a Group II-IV-V compound.

55. (Previously presented) The method of claim 54, wherein each first semiconductor material is overcoated with a second semiconductor material.

56. (Previously presented) The method of claim 54, wherein each first semiconductor material has a first band gap and each second semiconductor material has a second band gap that is larger than the first band gap.

57-66. (Cancelled)

67. (Previously presented) The laser of claim 44, wherein each first semiconductor material is selected from the group consisting of ZnS, ZnSe, ZnTe, CdS, CdSe, CdTe, HgS, HgSe, HgTe, AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, GaSe, InN, InP, InAs, TlSb, TlN, TlP, TlAs, TlSb, PbS, PbSe, PbTe, and mixtures thereof.

68. (Previously presented) The laser of claim 45, wherein each second semiconductor material is ZnO, ZnS, ZnSe, ZnTe, CdO, CdS, CdSe, CdTe, MgO, MgS, MgSe, MgTe, HgO, HgS, HgSe, HgTe, AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, InN, InP, InAs, InSb, TlN, TlP, TlAs, TlSb, TlSb, PbS, PbSe, PbTe, or mixtures thereof.

69. (Previously presented) The laser of claim 43, wherein each nanocrystal has a diameter of less than about 10 nanometers.

70. (Previously presented) The method of claim 50, wherein each first semiconductor material is selected from the group consisting of ZnS, ZnSe, ZnTe, CdS, CdSe, CdTe, HgS, HgSe, HgTe, AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, GaSe, InN, InP, InAs, TlSb, TlN, TlP, TlAs, TlSb, PbS, PbSe, PbTe, and mixtures thereof.

71. (Previously presented) The method of claim 51, wherein each second semiconductor material is ZnO, ZnS, ZnSe, ZnTe, CdO, CdS, CdSe, CdTe, MgO, MgS, MgSe, MgTe, HgO, HgS, HgSe, HgTe, AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, InN, InP, InAs, InSb, TlN, TlP, TlAs, TlSb, TlSb, PbS, PbSe, PbTe, or mixtures thereof.

72. (Previously presented) The method of claim 49, wherein each nanocrystal has a diameter of less than about 10 nanometers.

73. (Previously presented) The method of claim 54, wherein each first semiconductor material is selected from the group consisting of ZnS, ZnSe, ZnTe, CdS, CdSe, CdTe, HgS, HgSe, HgTe, AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, GaSe, InN, InP, InAs, TlSb, TlN, TlP, TlAs, TlSb, PbS, PbSe, PbTe, and mixtures thereof.

74. (Previously presented) The method of claim 55, wherein each second semiconductor material is ZnO, ZnS, ZnSe, ZnTe, CdO, CdS, CdSe, CdTe, MgO, MgS, MgSe, MgTe, HgO, HgS, HgSe, HgTe, AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, InN, InP, InAs, InSb, TlN, TlP, TlAs, TlSb, TlSb, PbS, PbSe, PbTe, or mixtures thereof.

75. (Previously presented) The method of claim 53, wherein the plurality of nanocrystals have an rms deviation in diameter of less than 15%.

76. (Previously presented) The method of claim 53, wherein each nanocrystal has a diameter of less than about 10 nanometers.

77. (New) A laser comprising:

an optical gain medium comprising a concentrated solid including a plurality of colloidally grown semiconductor nanocrystals, the plurality of semiconductor nanocrystals being close-packed and having an rms deviation in diameter of less than 15%; and

a cavity arranged relative to the optical gain media to provide feedback, wherein the concentrated solid provides gain to an optical signal at an energy equal to or less than the maximum band gap emission of the nanocrystals.

78. (New) The laser of claim 77, wherein each of the plurality of semiconductor nanocrystals includes a same or different first semiconductor material selected from the group consisting of a Group II-VI compound, a Group II-V compound, a Group III-VI compound, a Group III-V compound, a Group IV-VI compound, a Group I-III-VI compound, a Group II-IV-VI compound, and a Group II-IV-V compound.

79. (New) The laser of claim 78, wherein each first semiconductor material is selected from the group consisting of ZnS, ZnSe, ZnTe, CdS, CdSe, CdTe, HgS, HgSe, HgTe, AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, GaSe, InN, InP, InAs, TlSb, TlN, TlP, TlAs, TlSb, PbS, PbSe, PbTe, and mixtures thereof.

80. (New) The laser of claim 78, wherein each first semiconductor material is overcoated with a second semiconductor material.

81. (New) The laser of claim 80, wherein each first semiconductor material has a first band gap and each second semiconductor material has a second band gap that is larger than the first band gap.

82. (New) The laser of claim 80, wherein each second semiconductor material is ZnO, ZnS, ZnSe, ZnTe, CdO, CdS, CdSe, CdTe, MgO, MgS, MgSe, MgTe, HgO, HgS, HgSe, HgTe,

AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, InN, InP, InAs, InSb, TlN, TlP, TlAs, TlSb, TlSb, PbS, PbSe, PbTe, or mixtures thereof.

83. (New) The laser of claim 77, wherein each nanocrystal has a diameter of less than about 10 nanometers.

84. (New) The laser of claim 77, wherein the concentrated solid including a plurality of colloidally grown semiconductor nanocrystals is disposed on a substrate, wherein the substrate is made from a material that does not react with the nanocrystals.

85. (New) The laser of claim 77, wherein the colloidally grown semiconductor nanocrystals are substantially spherical in shape.

86. (New) A method of amplifying an optical signal comprising:

directing an optical beam into a gain medium including a concentrated solid including a plurality of colloidally grown semiconductor nanocrystals, the plurality of semiconductor nanocrystals being close-packed and having an rms deviation in diameter of less than 15%, wherein the concentrated solid is substantially free of defects and provides gain to the optical signal at an energy equal to or less than the maximum band gap emission of the nanocrystals when excited by a source.

87. (New) The method of claim 86, wherein each of the plurality of semiconductor nanocrystals includes a same or different first semiconductor material selected from the group consisting of a Group II-VI compound, a Group II-V compound, a Group III-VI compound, a Group III-V compound, a Group IV-VI compound, a Group I-III-VI compound, a Group II-IV-VI compound, and a Group II-IV-V compound.

88. (New) The method of claim 87, wherein each first semiconductor material is selected from the group consisting of ZnS, ZnSe, ZnTe, CdS, CdSe, CdTe, HgS, HgSe, HgTe, AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, GaSe, InN, InP, InAs, TlSb, TlN, TlP, TlAs, TlSb, PbS, PbSe, PbTe, and mixtures thereof.

89. (New) The method of claim 87, wherein each first semiconductor material is overcoated with a second semiconductor material.

90. (New) The method of claim 89, wherein each first semiconductor material has a first band gap and each second semiconductor material has a second band gap that is larger than the first band gap.

91. (New) The method of claim 89, wherein each second semiconductor material is ZnO, ZnS, ZnSe, ZnTe, CdO, CdS, CdSe, CdTe, MgO, MgS, MgSe, MgTe, HgO, HgS, HgSe, HgTe, AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, InN, InP, InAs, InSb, TlN, TlP, TlAs, TlSb, TlSb, PbS, PbSe, PbTe, or mixtures thereof.

92. (New) The method of claim 86, wherein each nanocrystal has a diameter of less than about 10 nanometers.

93. (New) The method of claim 86, wherein the concentrated solid including a plurality of colloidally grown semiconductor nanocrystals is disposed on a substrate, wherein the substrate is made from a material that does not react with the nanocrystals.

94. (New) The method of claim 86, wherein the colloidally grown semiconductor nanocrystals are substantially spherical in shape.

95. (New) A method of forming a laser comprising:

arranging a cavity relative to an optical gain medium to provide feedback to the optical gain medium, wherein the optical gain medium comprises a concentrated solid including a plurality of colloidally grown semiconductor nanocrystals, the plurality of semiconductor nanocrystals being close packed and having an rms deviation in diameter of less than 15%.

96. (New) The method of claim 95, wherein each of the plurality of semiconductor nanocrystals includes a same or different first semiconductor material selected from the group consisting of a Group II-VI compound, a Group II-V compound, a Group III-VI compound, a Group III-V compound, a Group IV-VI compound, a Group I-III-VI compound, a Group II-IV-VI compound, and a Group II-IV-V compound.

97. (New) The method of claim 96, wherein each first semiconductor material is selected from the group consisting of ZnS, ZnSe, ZnTe, CdS, CdSe, CdTe, HgS, HgSe, HgTe, AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, GaSe, InN, InP, InAs, TlSb, TlN, TlP, TlAs, TlSb, PbS, PbSe, PbTe, and mixtures thereof

98. (New) The method of claim 96, wherein each first semiconductor material is overcoated with a second semiconductor material.

99. (New) The method of claim 96, wherein each first semiconductor material has a first band gap and each second semiconductor material has a second band gap that is larger than the first band gap.

100. (New) The method of claim 98, wherein each second semiconductor material is ZnO, ZnS, ZnSe, ZnTe, CdO, CdS, CdSe, CdTe, MgO, MgS, MgSe, MgTe, HgO, HgS, HgSe, HgTe, AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, InN, InP, InAs, InSb, TlN, TlP, TlAs, TlSb, TlSb, PbS, PbSe, PbTe, or mixtures thereof.

101. (New) The method of claim 95, wherein each nanocrystal has a diameter of less than about 10 nanometers.

102. (New) The method of claim 95, wherein the concentrated solid including a plurality of colloidally grown semiconductor nanocrystals is disposed on a substrate, wherein the substrate is made from a material that does not react with the nanocrystals.

103. (New) The method of claim 95, wherein the colloidally grown semiconductor nanocrystals are substantially spherical in shape.